

What is claimed is:

1. A method for controlling a powertrain coupled to a vehicle, the powertrain having an internal combustion engine coupled to a transmission, the vehicle operated by a driver, the method comprising:

determining a desired vehicle trajectory;

adjusting an engine operating parameter to maintain positive powertrain output when an actual vehicle trajectory is below said desired vehicle trajectory; and

adjusting said engine operating parameter to transition from positive powertrain output to negative powertrain output when said actual vehicle trajectory is above said desired vehicle trajectory.

2. The method recited in Claim 1 further comprising limiting powertrain output rate of change during said transition.

3. The method recited in Claim 1 wherein said step of adjusting said engine operating parameter to transition from positive powertrain output to negative powertrain output further comprises adjusting said engine operating parameter to transition from positive powertrain output to negative powertrain output when said actual vehicle trajectory is above said desired vehicle trajectory by a predetermined amount.

4. The method recited in Claim 1 wherein said vehicle trajectory is a vehicle speed trajectory.

5. The method recited in Claim 1 wherein said vehicle trajectory is a vehicle acceleration trajectory.

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5 6. The method recited in Claim 1, wherein the engine is coupled to the transmission via a torque converter, wherein said positive powertrain output is maintained by maintaining torque converter input speed greater than torque converter output speed.

10 7. The method recited in Claim 1 wherein said desired vehicle trajectory is based on vehicle and engine operating conditions.

15 8. The method recited in Claim 1 wherein said desired vehicle trajectory is based on a position of a transmission lever.

20 9. The method recited in Claim 8 wherein said level selects between at least the following gears: reverse, neutral, a first forward, and a second forward.

25 10. The method recited in Claim 1 wherein adjusting steps are executed when a driver has released an accelerator pedal.

30 11. The method recited in Claim 1, wherein the engine is coupled to the transmission via a torque converter, wherein said torque converter is unlocked while maintaining positive powertrain output and then locked after transitioning from positive to negative powertrain output.

12. The method recited in claim 1 further comprising the step of controlling powertrain output to a required negative powertrain output to maintain said vehicle trajectory at or below said maximum allowed vehicle trajectory.

13. A method for controlling a powertrain coupled to a vehicle, the powertrain having an internal combustion engine coupled to a transmission via a torque converter having an input speed and an output speed, the vehicle operated by a driver, the method comprising:

indicating when the driver requests a decrease in powertrain output;

in response to said indication, determining a desired vehicle trajectory; and

maintaining positive powertrain output when an actual vehicle trajectory is below said desired vehicle trajectory.

14. The method recited in Claim 13 wherein said maintaining further comprises maintaining powertrain output by adjusting an engine operating parameter to sustain the torque converter input speed greater than the torque converter output speed.

15. The method recited in Claim 13, wherein said desired vehicle trajectory is based on vehicle operating conditions.

16. The method recited in Claim 15 wherein said vehicle-operating conditions are selected from the group consisting of vehicle speed, actual gear ratio, and selected transmission gear.

17. A method for controlling a powertrain coupled to a vehicle, the powertrain having an internal combustion engine coupled to a transmission via a torque converter having an input speed and an output speed, the vehicle operated by a driver, the method comprising:

indicating when the driver requests a decrease in powertrain output;

in response to said indication, determining a desired vehicle trajectory; and

maintaining positive powertrain output when an actual vehicle trajectory is below said desired vehicle trajectory by adjusting an engine operating parameter to sustain the torque converter input speed greater than the torque converter output speed.

18. A method for controlling a powertrain coupled to a vehicle, the powertrain having an internal combustion engine coupled to a transmission, the vehicle operated by a driver, the method comprising:

determining a desired vehicle speed trajectory; adjusting an engine torque to maintain positive powertrain output when an actual vehicle speed trajectory is below said desired vehicle speed trajectory; and

adjusting said engine torque to transition from positive powertrain output to negative powertrain output when said actual vehicle speed trajectory is above said desired vehicle speed trajectory.

19. The method recited in Claim 18 wherein said desired vehicle speed trajectory is based on a vehicle operating parameter.